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No. A-214

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IN THE

Supreme Court of the United States

October Term, 1982

Jeannine Honicker,
Petitioner,

v.

United States of America,

Nunzio Palladino, John Ahearne,
Victor Gilinsky, Thomas Roberts,
and Peter Bradford, Commissioners,
United States Nuclear Regulatory Commission,

and

United States Nuclear Regulatory Commission,
Respondents.

On Petition for a Writ of Certiorari
To the U.S.Court of Appeals for the District of
Columbia Circuit

Supplemental Appendix to the Petition for a Writ of Certiorari

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Counsel for Petitioner

APPENDIX D
Order and Opinion.

Federal Register / Vol. 46 No. 149 / 39573
Tuesday, August 4, 1981 / Rules and Regulations

NUCLEAR REGULATORY COMMISSION
10 CFR Part 2
Denial of Petition for Revoking Nuclear Plant Licenses

AGENCY: Nuclear Regulatory Commission
ACTION: Denial of a Petition requesting the NRC to revoke the licenses of all nuclear plants and all other fuel cycle facilities except those involving isolation of hazardous radioactive material.

SUMMARY: The Commission has determined that the petition filed by Ms. Jeannine Honicker requesting a permanent shutdown of all licensed nuclear plants and associated fuel cycle activities, except waste disposal facilities, should be denied. The Commission has found that the Honicker petition greatly overestimates the health effects caused by radioactive effluents from the nuclear fuel cycle. The Commission has also rejected the petition's legal argument that nuclear power must be held unlawful if it can be shown that its health impacts will include deaths among the general public.

EFFECTIVE DATE: August 4, 1981.
FOR FURTHER INFORMATION CONTACT: E. Leo Slaggie, Attorney, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington D.C. 20555, 202-634-3224.

SUPPLEMENTARY INFORMATION:

1. Background

Ms. Jeannine Honicker of Nashville, Tennessee, filed before the Nuclear Regulatory Commission (NRC) a petition dated July 29, 1978 asking the Commission to revoke the licenses of all nuclear plants and virtually all other nuclear fuel cycle activities except those dealing with disposal of wastes.[1] The petition asserted that the nuclear fuel cycle is "inextricably intertwined with the release of deadly poisons to the biosphere." The petition claimed that "hundreds to thousands of additional cancers" are now occurring as a result of routine releases of radioactive fuel cycle effluents and that "on the order of 100 deaths will occur at the milling stage of the nuclear fuel cycle to future people for each day that fuel is produced." Petition at 126. The petition called for substantial action "to address the emergency" within thirty days.

In a letter to Ms. Honicker dated September 7, 1978 the Commission said that because the petition raised complex technical issues the Commission would await an analysis from its technical staff [46 Fed. Reg. 39574] before deciding whether the merits of the petition should be addressed in the first instance by the staff, pursuant to 10 C.F.R. 2.206,[2] or by

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[1] The "nuclear fuel cycle" associated with the enriched uranium-fueled power reactors used by the U.S. nuclear industry includes uranium mining and milling, production of uranium hexafluoride, isotopic enrichment, fuel fabrication, spent fuel storage and disposal, possible reprocessing of irradiated fuel, transportation of radioactive materials and management of low- and high-level wastes. Radioactive effluents and other impacts associated with waste management and reprocessing were recently discussed by the Commission in the statement of consideration supporting a final rule specifying fuel cycle impact values to be included in environmental reports and impact statements for individual light-water nuclear power reactors. *See* 44 *Fed. Reg.* 45362 (August 2, 1979).

[2] Section 2.206 of Title 10, Code of Federal Regulations, provides that any person may request the Director of Nuclear Reactor Regulation, the Director of Nuclear Material Safety and Safeguards, or the Director of the Office of Inspection and Enforcement, as appropriate, to initiate proceedings to revoke licenses. The Director's response to a 2.206 request may be reviewed by the Commission on its own motion.

the Commission itself. The Commission concluded that no emergency action was warranted pending receipt of staff comments, "in view of [the Commission's] intent to address the matter expeditiously, and the lack of a clear demonstration of a need for emergency action."

On October 26, 1978 the staff submitted to the Commission a written analysis of the petition, SECY-78-560. The staff's response reviewed present knowledge about radiation health effects as applied to the health impacts of the nuclear fuel cycle and concluded that the Honicker petition should be denied. Rather than directing the staff to issue a denial, however, the Commission concluded that the Honicker petitin constituted primarily a challenge to the adequacy of NRC's regulations and licensing standards and should, therefore, be answered directly by the Commission itself, pursuant to 10 CFR 2.802 and the Commission's general supervisory powers. The Commission informed Mrs. Honicker of this conclusion in a letter dated December 7, 1978 and also reaffirmed its earlier finding that no clear need had been demonstrated for emergency relief pending full consideration and disposition of the petition. With regard to the denial of emergency relief, the letter stated:

> The Commissio notes that your claim that a large number of deaths will result from each days's operation of the nuclear fuel cycle rests primarily on the assertion that radon releases associated with uranium mill tailings will cause deaths among generations far in the future. The NRC has been considering what significance should be attached to these radon releases. The Commission has previously determined that an immediate shutdown of nuclear plants is not required while the radon releases associated with uranium mill tailings are under consideration.
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> Second, with regard to radiation health effects from fuel cycle emmissions other than radon, the cumulative risk over the relatively short period before a decision on your petition can be reached should be small. The licenses which you ask the Commission to revoke were issued after careful consideration of the health and environmental impacts as well as the need for the activity being licensed. The significance and interpretation of much of the data on which you rely are presently the subject of considerable controversy within the scientific community. Thus, the Commission has determined that these licenses should not be summarily revoked pending full review of the issues you raise.

The December 7, 1978 letter offered Mrs. Honicker an opportunity to comment on the technical staff's analysis of the petition and invited her participation in an ongoing proceeding to analyze the health effects of low-level radiation as related to current occupational exposure standards. Ms. Honicker filed on January 5, 1979 a 63-page commentary on the NRC staff's analysis. The Commission asked for the technical staff's views on this commentary and also directed several specific questions to the staff on issues relevant to the petition. The Staff submitted its reply on March 19, 1979. SECY-79-180.

The Three Mile Island accident on March 28, 1979 delayed the Commission's response to the Honicker petition. However, there were a number of exchanges of communications between persons representing Ms. Honicker and the NRC technical staff concerning the subject of the petition. These exchanges amounted in part to a running commentary on developments in the field of radiological health effects. In a letter dated August 6, 1978, Ms. Honicker submitted a list of 38 citations to documents released subsequent to her January 5, 1979 commentary and asked that this material be considered as part of the Commission's review. A staff memorandum dated September 13, 1979 to the Commission's Office of the General Counsel provided detailed comments on many of

those documents and concluded that they did not add any significant support to the petition's arguments for a nuclear shutdown.

The staff comments and other documents and letters referred to above are included in the administrative record underlying the Commission's present action on the Honicker petition. Additional material related to nuclear fuel cycle health effects has been recently prepared by the Nrc technical staff in response to a Commission directive that an explanatory narrative be prepared for use in conjunction with the recently promulgated final fuel cycle rule ("Table S-3"). See 44 FR 45362 (August 2, 1979). The draft narrative proposed by the staff in response to this directive has been issued as a proposed amendment to the fuel cycle rule and is included in the administrative record as a source of health effects estimates relevant to the Commission's disposition of the Honicker petition. 46 FR 15154 (March 4, 1981). Other documents in the administrative record are available for public inspection in the Commission's Public Document Roomat 1717 H Street, NW., Washington, DC 20555.

Based on the material in the administrative record and on its legal analysis of the arguments presented in the Honicker petition, the Commission has concluded that the petition should be denied. The explanation for this decision is set out below.

2. Description of the Petition

The Honicker Petition bases its request for a total nuclear shutdown on the argument that radioactive effluents released in normal operation of nuclear plants and supporting fuel cycle activities are causing and will continue to cause unacceptable health effects.[3] The petition takes the position

[3]Previous requests that the Commission order a wide-scale shutdown of nuclear power activities have stressed the risk of accidents rather than the effects of normal operations. *See, e.g., Nader v. Ray,* 363 F.Supp. 946 (D.D.C. 1973). Although the Honicker petition refers to the possibility of accidental releases as a significant source of radiation health effects, the petition rests its case for a shutdown primarily on what it believes will be the health effects caused by r dioactive releases in normal operations.

that if one or more fatal cancers will result from continuing the nuclear power program, then the program should be terminated at once. To determine the health effects of radioactive effluents the petition relies on what it calls the "medical principle" that there is no known threshold or safe level of ionizing radiation below which such radiation can be said with reasonable certainty to pose no risk to human health. This "no threshold" hypothesis underlies the petition's estimates of various nuclear fuel cycle health effects due to very low level radiation doses and, as the petition points out, is used by the NRC itself in estimating fuel cycle environmental impacts. The petition stresses that NRC health effects estimates based on the no-threshold hypothesis show fatal cancers resulting from normal fuel cycle radioactive releases.[4] The petition views/*46 Fed. Reg.*

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[4]For example, the petition refers to health effects estimates in the NRC's Generic Environmental Statement on the Use of Recycled Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors ("GESMO"), NUREG-0002 (1976). *See* Petition, page 134. Calculations in NUREG-0002 follow the hypothesis that the health effects due to low-level radiation are linearly proportional to dose. The risk factors used to convert radiation doses to estimated health effects were taken from the 1972 report of the U.S. National Academy of Sciences Advisory Committee on the Biological Effects of Ionizing Radiation, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation." (This is the so-called "BEIR" report, or "BEIR-I." A more recent BEIR report, BEIR-III, was released in 1980 and is discussed in Section 4 of this denial). These risk factors for low doses and dose rates were obtained by extrapolation from response data at high doses and dose rates.

Nuclear fuel cycle health effects estimates obtained on this basis are given in Table IV,J-14 of NUREG-0002, captioned "Estimated Health Effects U.S. [Nuclear] Industry, 1975-2000" which gives for total U.S. occupational, U.S. nonoccupational, and foreign cancer deaths as of the year 2000 the estimates 550, 530, and 28, respectively for a projected nuclear power generation capacity of 507,000 MWe by the year 2000. Recent capacity projections are considerably lower. The Energy Information Administration's 1979 Annual Report to Congress forecast a nuclear generation capacity between 160,000 and 200,000 MWe by the year 2000. DOE/EIA-0173(79), Vol.3, Table 5.12. On the other hand, the GESMO health effects figures, while assuming a larger industry than now appears likely, may have underestimated the contribution of long-term dose commitments to nuclear power health effects. More recent NRC

39574 these estimates as an admission by the NRC that lives are intentionally being sacrificed to generate electricity by nuclear power. The petition concludes that the nuclear power program therefore violates moral, statutory, constitutional and international law and should be halted at once. The petition argues that even if nuclear power were providing great economic benefits, which the petition contends it does not, such benefits could not make lawful or justified the loss of a single life. The petition states that "because human life and health are paramount considerations, the Commission may not balance the economic consequences of a shutdown against any visible

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estimates appear in the Commission's explanatory narrative proposed to accompany the final fuel cycle rule, 46 FR 15154 (March 4, 1981). Assuming a total of 190 nuclear power reactors—the number now operating, being built, or tentatively planned in the United States—the proposed narrative estimates, on the basis of a 100-year environmental dose commitment, an excess cancer mortality of 484 among the U.S. population, exclusive of health impacts from uranium mining and milling radon effluents. 46 FR 15167. For radon effluents the NRC technical staff has estimated that for the entire nuclear industry projected in 1985 radon releases "have a calculated potential to cause 61 [*sic*] premature deaths from cancer in the total U.S. population by the end of the 21st century." *See* "Radon Releases from Uranium Mining and Milling and Their Calculated Health Effects," NUREG-0757, page iii, February 1981.

These estimates represent the results of model calculations which describe the range of health effects deemed possible but should not be taken as hard and fast predictions that these estimated fatalities will in fact occur. With current knowledge the health effects of low-level radiation cannot be predicted with confidence. It is possible that (1)no health effects at all will be caused or (2)the health effects actually caused will be greater than estimated.

threat to human health."[5] Petition at page 129.

The petition's own nuclear power health effects estimates are much larger than NRC estimates.[6] The petition further states that in view of potential improvements in data and analysis its own estimates "may be orders of magnitude too low" but that in any event "the best available current evidence now indicates that release to the biosphere of these poisons [*i.e.*, radioactive effluents] at any level attainable by present design of the fuel cycle constitutes a serious public

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[5]The petition claims that shutting down the nuclear industry to avoid loss of life would noty in any case involve much economic sacrifice because the electric utility industry has "vast unused generating capacity and current inexpensive methods of electricity generation that do not have associated health effects of this magnitude." Petition, page 135. The petition cites energy conservation and solar power as alternatives to nuclear power and fossil fuel combustion in meeting new electrical needs. Ms. Honicker's "Comments of the Petitioner's Staff on the NRC Staff Response to Her Petition for Emergency and Remedial Action" filed January 5, 1979 provides additional argument aimed at showing that replacement power and conservation options are available so that an immediate ban on nuclear power would have only small immediate economic repercussions, apart from damage to the nuclear industry itself. Concerning this damage these "Comments" note: "The 130,000 workers in nuclear fuel cycle facilities may lose their present employment. The petition has not requested their imprisonment for criminal conspiracy." Comments at page 15. In support of the position that a nuclear shutdown would in the long run be beneficial, the Comments quote extensively from literature dealing with "soft" energy technology (*e.g.* conservation, solar heating, wind machines, organic converters) versus "hard" technology (large-scale generating facilities). In the Comments as in the petition itself, however, the question whether nuclear power is or is not economically beneficial appears to be only a side issue. The Comments stress: "There can be *no* economic benefits at the cost of human lives and liberties." Comments at page 11 (emphasis in the original).

[6]In its "Summary of the Physical Evidence," page 126, the petition asserts, among other things, that "*on the order of 100 deaths* will occur at the milling stage of the nuclear fuel cycle *to future peoples for each day that fuel is produced*" (emphasis in original), that "*[h]undreds to thousands of additional cancers* are occurring among citizens now living in the vicinity of fuel cycle facilities due to the designed routine releases and common accidental releases of radiotoxins" (emphasis in the original), and that "[t]he range of revised estimates for cancer and leukemia from routine fuel cycle releases is now from 100 to 1,000,000 annually."

health burden and a loss of life to millions of people over long periods of time." Petition at page 127. In view of these health effects of nuclear power, the petition asserts that the NRC cannot assure that the nuclear facilities it regulates can be operated "without endangering the health of the public," and that the Commission is, therefore, obliged under the Atomic Energy Act to shut those facilities down.

Going beyond the Atomic Energy Act as a basis for finding nuclear power unlawful, the petition cites the Fifth Amendment to the United States Constitution, specifically the language:

> No person shall be . . . deprived of life . . . without due process of law . . .

as a prohibition against government action which imposes "upon a private citizen the risk of death, or a health burden which the individual citizen does not consent to bear." Petition at 142.

The petition frames the constitutional issues as follows:

> May a government agency which Congress has invested with regulatory power over the imposition of poisons to the general population, set as a reasonable standard a limit which allows any number of innocent citizens to die, involuntarily, without due process, without express constitutional delegation of this power from the people, without question? Certainly not.

Petition at 143. Because practical regulatory standards for the nuclear fuel cycle must permit the release of at least a small amount of rdioactive material, the petition concludes that no course other than complete shutdown of the industry can be reconciled with the Constitution.

Invoking international law as well, the petition characterizes present operation of the nuclear industry as an "intentional elevation of the death rate to an entire population" and therefore tantamount to "humanicide," a "crime of state" condemned by national and international

commitments to human rights.[7] Petition at 136 ff. The petition further describes the nuclear power program as a "national medical experiment" involving injury and death to unconsenting subjects and, therefore, unacceptable under principles set out by the 1946 Nuremberg International Military Tribunal.

3. Analysis of the Petition

As support for its shutdown request the Honicker petition has raised an extensive spectrum of objections to nuclear power, including risk of serious accidents, assertedly large health impacts from normal operations, and lack of need for more electricity in general and nuclear generation in particular. The petition touches on the impacts of virtually every stage of the nuclear fuel cycle, reproducing at length from the technical literature detailed material that is often highly controversial. Relatively little of this information is new. The NRC has considered much of it at one time or another in the past, either in challenges to licenses for particular nuclear facilities or in connection with petitions [*46 Fed. Reg. 39578*] for rulemaking to amend certain aspects of the Commission's regulations.[8] What is different about the

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[7]International declarations and covenants cited by the petition include the United Nations Universal Declaration of Human Rights (1948), the International Covenant on Civil and Political Rights (1966), and the American Declaration of the Rights and Duties of Man (Adopted by the Ninth International Conference of the American States, 1948). These documents typically include language guaranteeing every human being "the inherent right to life."

[8]For example, in responding to a 1976 petition by the New England Council [*sic*] on Nuclear Pollution the Commission addressed much te same arguments and evidence on health effects associated with radon releases from uranium mill tailings which the Honicker Petition invokes in arriving at the major portion of the fatalities which the Petition sees as a consequence of nuclear power. *See* 43 FR 15613 (April 14, 1978). The same issues are presently being addressed in licensing proceedings for a number of individual nuclear plants. *See* the *Matters of Philadelphia Electric Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), etc., ALAB-562, 10 NRC 437 (1979). In a recent rulemaking the Commission set out regulations and standards for the disposal of mill tailings aimed at keeping radon releases within acceptable limits. 45 FR 65521 (October 3, 1980).

Honicker petition is its attempt to use this evidence in a much more general fashion as a basis for arguing that the entire nuclear industry should be completely and permanently shut down. Accordingly, this response focuses on the question whether the petition has identified technical or legal problems which require no lesser remedy than immediate, complete, and final shutdown of the nuclear industry.[9]

The petition's case for a shutdown can be divided into two distinct lines of argument. First, there is the claim that the Commission has greatly underestimated the health effects costs of nuclear power and overestimated the economic benefits. This quantitative line of argument is basically a factual challenge to findings the Commission has made in licensing and rulemaking decisions that nuclear power health effects will lie within a range deemed acceptable and that the benefits of operating licensed facilities will outweigh their adverse impacts on health and the environment.

Second, the petition argues that regardless of the quantitative details of the cost-benefit balance, a nuclear shutdown is required because, as a matter of law, even a single health effect is too much; cost-benefit analysis is irrelevant when the costs are in lives. To invoke this legal argument the petition relies on a fact not in dispute: The models and risk factors generally used to estimate the health effects caused by nuclear fuel cycle rdioactive effluents all show some fatal cancers. The petition concludes that this fact alone suffices to prove that the NRC violates the health and safety requirements of the Atomic Energy Act by licensing nuclear plants and, more fundamentally, denies inalienable rights secured by the Constitution and international law.

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[9]We proceed on the assumption that the Commission would have the authority to grant the requested relief, though it is not clear that the Commission could in fact order the permanent shutdown of the entire nuclear industry, as distinct from shutting down specific facilities pending correction of safety or environmental problems. The Supreme Court has indicated that resolution of such "fundamental policy questions" as the "choice to at least try nuclear energy" has been made by Congress. *See Vermont Yankee Nuclear Power Corp.* v. *NRDC*, 435 U.S. 519 (1978) at 557, 558.

4. Response to the Petition's Quantitative Cost-Benefit Argument

a. *Health Effects Estimates.*

The Commission believes that the best available evidence contradicts the petition's quantitative estimates of nuclear power health effects and continues to support the NRC's much lower estimates. The petition's health impact predictions are high for a variety of reasons. Sometimes the petition misreads the scientific data it cites to show that radiation health effects have been underestimated.[10] The petition also places great reliance on certain radiation health effects studies which have been strongly questioned by the scientific community. For example, the petition cites as an "important data base" the results obtained by Mancuso, Stewart and Kneale in a study of workers exposed to radiation at Hanford. Health Physics, 33:369-385 (1977). This study has been criticized recently in the 1980 report of the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation ("BEIR" Committee), "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," National Academy of Sciences, 1980 ("BEIR-III"). Finding the Hanford results unpersuasive evidence for rejecting previous radiation risk estimates, the BEIR Committee noted the low statistical power of the Hanford data and the availability of alternative explanations for the observed dose associations. The Committee stated that at present "there seems to be little reason to abandon the body of epidemiologic evidence on radiation-induced cancer that, although based on greater exposures, yields consistent and statistically stable estimates." BEIR-III, page 556 (*page* references are to the typescript edition of BEIR-III).

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[10]The NRC staff, in responding to the petitioner's claim that the biological effects of some forms of low-level radiation are much higher than federal regulatory authorities have assumed, has pointed out that the petition mistakenly relied on irrelevant data taken at high exposures and applied an erronious graphical analysis which, if correct, woudl in fact show that at sufficiently low exposures no health effects would occur. *See* SECY-78-560, p. 38 ff.

Other radiation health effects studies relied on by the Honicker petition were found seriously flawed by the BEIR-III report. These include work by Najarian on cancer deaths among workers at the Portsmouth Naval Shipyard in New Hampshire, Lancet 1:1018-1020 (1978), an analysis by Archer on possible correlations between variations in natural background radiation and cancer rates, Health Physics 34:237-247 (1978); analysis of the tri-state leukemia survey by Bross and Natarajan, J.Amer.Med.Assoc. 237:2399-2401, 1977; testimony by Bross before the U.S. Senate Committee on Commerce, Oversight Committee for Radiation Safety and Health, June 17, 1977); and studies by E.J. Sternglass (report on "Changes in Infant Mortality Patterns Following the Arrival of Fallout from the September 26, 1976 Chinese Nuclear Weapon Test" presented to the BEIR Committee July 18, 1977). See comments in BEIR-III, pages 553-568. The BEIR-III report found that none of these investigations justified a conclusion that previously accepted estimates of radiological risk were much too low, although the Committee stated that low-dose radiation effects on cell membranes, a radiation damage mechanism emphasized by Dr. Sternglass, merited further study. BEIR-III, pp.561-566.

Overall, the 1980 BEIR-III Report discussion of radiological risk does not bear out the petition's speculations that radiation risk factors set out in the 1972 BEIR report and used by the NRC[11] would turn out to be much too low. Although a simple comparison of risk factors cannot readily be made because the 1980 report has adopted a more complicated method for estimating cancer risks than the linear dose response model used in the 1972 report, the BEIR-III Committee has made no major qualitative change from its 1972 assessment of radiological risk. For low LET (linear energy transfer) radiation, the Committee found that the 1972 linear hypothesis risk estimates might well be too high.[12] For high LET radiation, the Committee saw a

[11]See note 4 above.

[12]The National Council on Radiation Protection and Measurements (NCRP) has also concluded that use of the linear hypothesis to estimate human health effects of low-LET radiation at low doses and low-dose rates

possibility that the linear hypothesis might underestimate risk at low doses but, consistent with its appraisal of the studies cited in the Honicker petition, apparently saw no indication that the potential underestimate was sufficiently serious to require revision of previous risk [*46 Fed. Reg. 39577*] estimates. The BEIR-III Committee summarized its position as follows:

> It is by no means clear whether dose rates of gamma or x-radiation of about 100 mrads/yr are in any way detrimental to exposed people; any somatic effects would be masked by environmental or other factors that produce the same types of health effects as does ionizing radiation. It is unlikely that carcinogenic effects of low-LET radiation administered at this dose rate will be demonstrated in the foreseeable future. Notwithstanding these limitations, the Committee recognizes the need to estimate the effects on human population exposed to radiation at very low doses. In most cases, the linear hypothesis, as the 1972 BEIR report indicated, probably overestimates, rather than underestimates, the risk from low-LET radiation. For high-LET radiation, such as from internally deposited alpha-emitting radionuclides, the application of the linear hypothesis is less likely to lead to overestimates of risk and may in fact lead to underestimates.

BEIR-III, page 187.[13]

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based on data at high doses and dose rates, may overestimate those effects by a factor of between 2 and 10. *See* Chapter 12 of NCRP Report No. 64, "Influence of Dose and Its Distribution in Time on Dose-Response Relationships for Low-LET Radiation."

[13]Regulations of the Environmental Protection Agency covering most nuclear fuel cycle operations, 40 CFR Part 190, are intended to assure that these operations will be conducted so that resulting population exposures to members of the public will be kept well below 100 mrads per year. See 40 CFR 190.10. Fuel-cycle-originated releases of radon, which are excepted from the EPA rules are covered by standards established by the NRC. These releases are associated with the mining and milling of uranium and disposal of tailings. Resultant health effects primarily involve high-LET radiation. Generally, the NRC standards for milling operations and tailings

With regard to genetic effects, the BEIR-III report notes:

> Although the Committee used a new method of estimating genetic effects expressed in the first generation, the present estimates of genetic effects are not notably different from those of the 1972 BEIR report.

BEIR-III, page 7. In sum, the findings of the BEIR-III report do not support the proposition that NRC health effects estimates based on the 1972 BEIR risk factors need substantial revision.[14]

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disposal assure that resulting radon exposures will be no more than a small percentage of background exposure to radon already naturally present. *See* Final Generic Environmental Impact Statement on Uranium Milling, NUREG-0706, September 1980, pages 12-13—12-15 and table 12.2.II. Risks associated with such radon exposures were described in note 4, below, and are also discussed later on in this response. See text associated with notes 15, 16, and 17.

[14]The Commission is aware of recently publicized studies of the Hiroshima radiation exposure data which raise questions about whether BEIR-III may have underestimated the hazards of low-LET radiation. *See* "New A-Bomb Studies Alter Radiation Estimates," *Science* Vol 212, p.900, May 22, 1981. In advance of further exposition and peer review it would be premature to draw precise quantitative conclusions about the changes, if any, which reinterpretation of the Hiroshima data might introduce into the radiologial risk factors used by the NRC. Because the NRC has assumed that low-LET radiation is potentially harmful, even at low doses and dose rates, and has used the linear, no-threshold model for estimating health effects, the Commission does not see any need to change its qualitative perception of radiological risk at this time. The NRC technical staff has reported to the Commission that the suggested revisions, if borne out by further study, would lead to quantitative changes in current risk estimates at the most on the order of a factor of two. This magnitude of change would not affect the Commission's views on the merits of the Honicker petition.

Another reason for the petition's attribution of excessive health consequences to nuclear power is that the petition takes inadequate account of measures short of shutting down the entire fuel cycle which can be taken to reduce radioactive releases, if the need is demonstrated, to keep potential health effects well below the high levels the petition predicts. The petition also assumes overly pessimistic scenarios in assessing the effects of fuel cycle releases on future generations. The petition repeatedly argues that fuel cycle activities involve a "death commitment" of 80 to 100 deaths per day (see, *e.g.*, Petition at 126,1270. This point does not refer to near term fatalities but rather to cancers which the petitoner believes will occur over future generations over tens of thousands of years.[15]

As support for its view that radon from tailings piles presents a serious and unavoidable hazard, the petition cites a 1977 memorandum by Dr. Walter Jordan, a member of the Commission's Atomic Safety and Licensing Board Panel. In his memorandum, Dr. Jordan pointed out that earlier NRC staff estimates of fuel cycle radon releases had erroneously ignored the continuing radon generation in tailings piles for thousands of years. He noted that seepage of this radioactive gas could lead to large total doses to future generations. Using radon release figures which assume existence of a two-foot thick cover over the tailing to limit seepage,[16] Dr. Jordan

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[15]Radon-222, an alpha particle emitter, has only a four-day half-life, but will be continuously generated in tailings piles by the decay of Radium-226, which has a half-life of about 1600 years, and which in turn is the daughter product of Thorium-230, a radionuclide which has a half-life of about 86,000 years.

[16]The petition states that Dr. Jordan's figures assumed "optimum management of the tailings." Petition, page 42. This is incorrect. As is discussed in the text below, methods of tailings pile stabilization far more effective than adding a two-foot earth cover are now available and cost-effective. Recent NRC regulations favor below-grade disposal and require earth cover of not less than three meters, stabilized so as to reduce to negligible amounts the potential for significant wind and water erosion. *See* amendments to 10 CFR Parts 30, 40, 70, and 150. 45 *Fed. Reg.* 65521 (October 3, 1980).

estimated that deaths and genetic effects in future generations resulting from the annual fuel requirement for a single reactor "can run into the hundreds." Taking the rate to be 400 deaths per reactor annual fuel requirement and apparently assuming 70 operating reactors, the petition concluded that "the loss of life among future citizens from each year's commitment to the nuclear fuel cycle is 28,000 [or on the order of 80 lives per day of fuel cycle operation] from the mill tailings alone." Petition at 42.

If this petition were correct, it would make nuclear power almost as dangerous as the automobile, and would call for prompt remedial action. However, it is unrealistic, because NRC is now taking measures to reduce radon releases from tailings piles. NRC regulations promulgated since the filing of the petition were intended to assure that mill tailings piles will be [*sic*] abandoned with no more than a minimal amount of covering and left without further attention. *See* Amendments to 10 CFR Parts 30, 40, 70, and 150, 45 FR 65521 (October 3, 1980).

The new regulations, promulgated to implement the Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604 (92 Stat. 3037), take account of "the inescapable fact that the tailings will * * * remain hazardous for extremely long periods of time." The regulations set radon emissions limits aimed at assuring "that radon exhalation rates (from tailings disposal sites) will be within the range of flux rates occurring naturally from nearby soils." 45 FR 65525. To cope with the need to maintain these rates for extremely long periods these regulations incorporate design features to make disposal sites "similar to land forms which have been known to be stable for extremely long periods of time * * *. In general, the condition of tailings disposal sites should be virtually the same as those in surrounding environs and should remain so without active care and maintenance." In the Final Generic Environmental Impact Statement on Uranium Milling, NUREG-0706, September 1980, the NRC technical staff estimated that .040 potential annual premature cancer deaths might result from continuous long-term radon releases from mill tailings generated in North

America until the year 2000, assuming the tailings are disposed of in accordance with the new requirements. See NUREG-0706, Section 12.3.4.4. For comparison, the staff estimated a continuing annual rate of six premature cancer deaths if no tailings control measures are implemented. NUREG-0706, page 5.

The control measures required by the NRC are thus expected to reduce the estimated potential health effects of radon releases by more than two orders of magnitude. It would appear [46 Fed. Reg. 52574] technically possible though very expensive to reduce these releases to zero, in effects improving upon natural conditions prior to the mining of uranium, by requiring some kind of extremely deep burial of the tailings. The control standards now in force reflect the Commission's view that the costs of achieving complete isolation of tailings would not be justified by the highly uncertain additional benefits.[17]

As this discussion of radon releases illustrates, the petition's claims that the nuclear fuel cycle creates excessive radiological risk, even if correct, do not state a case for the total shutdown the petitioner requests, so long as relief would be available through additional control measures, either industrywide or at particular facilities as appropriate. The radon health effect evidence cited by the petition demonstrates a need for improved regulation of mill tailings disposal. The Commission believes its recent rule amendments have fulfilled this need. Similarly, with regard to fuel cycle radioactive releases other than radon, the appropriate remedy for an unacceptably high release level would be additional control measures to limit the release.

The Commission has confidence that its regulatory program keeps radioactive releases within acceptable limits. Each facility which the Commission licenses is reviewed at

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[17]Petitions for review of the Commission's uranium milling license requirements are presently before the U.S. Court of Appeals for the Tenth Circuit in consolidated cases. *Kerr-McGee Corporation, et al. v. NRC*, Nos. 80-2043, 80-2229, 80-2269, and 80-2271. The petitioners have contended that the regulations are unnecessarily strict.

the time of licensing to assure that radiation exposures due to facility operation not only will be less than maximum permissible limits set out in 10 CFR 20, but also will be kept "as low as reasonably achievable" ("ALARA"). *See* 10 CFR 20.1 and 10 CFR Part 50, Appendix I. By the ALARA standard the Commission does not mean "as low as possible" but rather "as low as reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest." 10 CFR 20.1(b). The ALARA approach thus expresses the Commission's view that radiation exposures should be kept at or below a level justified by the benefit of the operation which produces them. The Commission recognizes, however, that at some point the cost of reducing the exposure still further may become so great in terms of financial outlays, foregone opportunities, or both that it is unreasonable to require further reduction. Under the ALARA principle, the fact that a liocensed facility releases radioactive effluents that can cause potential health effects would not in itself constitute an argument for shutting down the facility. Indeed, the facility would not have been licensed in the first place without a finding by the Commission that the radiological impact of the facility is justified by a countervailing benefit and could not be reduced still further without a cost that would exceed the benefit of the reduction. This is not to say that the Commission has necessarily struck the right balance in every licensing action or that nuclear fuel cycle exposures are at an all-time irreducible minimum. If the Commission's previous decisions now need modification, however, means for correction and change are readily available.

In summation, the petition is correct in saying there are some potential health costs of nuclear power, but the petition has failed to show that these costs are likely to be significantly different from the estimates the Commission has used in finding that licensed nuclear facilities, though not risk-free, will operate with adequate protection for public

health and safety. The appropriate response to reducing excessive radiation health effects, if they were demonstrated, would in any case focus on changes at particular facilities or amendments to particular regulations rather than termination of the industry. The petition's quantitative analysis greatly overestimates nuclear fuel cycle health effects and does not state a case for permanently shutting down the entire nuclear industry.

b. *Consequences of a Shutdown.* In addition to making a safety finding, before authorizing construction of a nuclear plant the Commission evaluates the environmental impact of the proposed facility [which includes potential impact on human health], as required by the National Environmental Policy Act of 1969 (NEPA), and determines whether the need for the facility offsets the environmental costs. *See, e.g. Kansas Gas and Electric Co., et al.* (Wolf Creek Generating Station, Unit 1), ALAB-462, 7 NRC 320, 327 (1978). The petition claims, however, that the nuclear power program—approximately 10 percent of U.S. generating capacity—could be shut down immediately without loss of benefits to anyone except the industry itself.[18] As its sole justification for this claim the petition cites data indicating that the electrical power industry has a capacity 32 percent in excess of peak load demands.[19] The petitioner appears to believe that any set of generating facilities constituting a percentage smaller than the "excess capacity" can be dropped from the system without cost to the public, regardless of the location of the plants, their newness or obsolescense, relative operating cost, or other factors which might otherwise be thought to

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[18]See note 5 above.

[19]More recent figures show that in July 1980 the peak load reserve margin, defined as the ratio of the difference between the system net capability and the peak load to the peak load itself, was approximately 30 percent. *Electric Power Monthly*, August 30, 1980, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0226 (80/08), Table 15, page 29. In 1980 nuclear power produced approximately 10.9% of all electricity generated in the United States. Nuclear power facilities now constitute slightly more than 10% of United States generating capacity.

bear on the need for a particular power plant. The Commission has a number of problems with this conclusion. A substantial amount of excess capacity beyond peak load demands, normally 15% to 25%, is needed as a normal reserve against foreseeable contingencies (i.e., scheduled and forced outages). Furthermore, the aggregate U.S. reserve margin does not by itself convey much information about the need for particular facilities, because this margin averages out levels of excess capacity and levels of insufficient capacity that may exist in specific systems or reliability councils. For example, during the summer of 1980, although reserves for the U.S. as a whole were adequate, specific systems faced load-shedding and other reliability problems.[20]

Nuclear plants generally function as base load units intended to operate on a more or less continuous basis. Even when there is unused capacity, the nuclear units are not the ones which stand idle. The immediate shutdown of these facilities would in most cases lead to their replacement by older, less reliable fossil-fueled power plants with higher economic costs and potential health impacts of their own. In certain areas of the country where there has been a major commitment to nuclear power, the shutdown of all nuclear plants could cause serious shortages and hardship.

The petition has not established that "excess capacity" has eliminated any significant benefit from nuclear power, nor does it deal with the liklihood that the power that would replace the nuclear units would be more expensive than [46 Fed. Reg. 39579] the nuclear power and that some replacement power would contravene national policy by using foreign oil. The possibility remains open that conservation or a switch to new technologies may eventually reduce or even eliminate the need for some nuclear generating facilities, the feasibility and timing of such replacement would depend strongly on individual situations. However, the petition does not make a case for shutting down the entire nuclear industry. For most plants, the Commission determined that the plants were

[20] In July 1980 the effective peak load reserve margin was reported to be 8%. *Electric Power Monthly*, August 1980, Table 14, page 28.

needed at the time they were licensed. The fact that plants are being used to generate electricity demonstrates their present need.

5. Response to the Petition's Legal Argument

The Commission recognizes that the Honicker petition does not oppose the nuclear power program solely or even primarily because of quantitative arguments about which way the cost-benefit balance tips. The petition asserts that regardless of the economic benefit the Commission cannot lawfully authorize activities which cause cancer deaths among the general population. The petition has noted that the Commission's own estimates of nuclear power health impacts include a number of radiologically induced cancer deaths among present and future populations.[21] Changes in nuclear technology that might reduce these health impact estimates to zero are not now foreseeable. Thus, if the law in fact prohibited licensing of nuclear plants so long as their impacts include cancer fatalities, the petition's legal argument would state a case for the shutdown of the industry.

The petition sees such a prohibition in the Fifth Amendment to the Constitution:

> No person shall be * * * deprived of life, liberty, or property, without due process of law.* * *

The Commission would readily accept the proposition that this language forbids the federal government to authorize or

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[21]The Commission assumes for the purposes of this response that in accordance with these estimates a small number of fatalities will actually be caused by radioactive releases from licensed nuclear fuel cycle activities. As we have noted previously in note 4, however, present knowledge of radiological risk is not sufficient to allow firm predictions that radiologically induced human cancers will in fact result from population exposure to the low doses and dose rates caused by releases by nuclear fuel cycle activities in normal operations. Because the estimated effects are small and indistinguishable compared to the number of fatal cancers occurring for other reasons, there seems little liklihood that either the presence or absence of cancers can be confirmed by direct measurement.

carry out without due process of law an activity which has the purpose of taking lives of persons under the protection of laws of the United States. The nuclear power program, however, is not such an activity. The purposeful taking of life has no part in the licensing of nuclear fuel cycle facilities. Any resulting harm is entirely an unwanted side effect to be minimized or eliminated where practicable, and risks are distributed more or less uniformly among the public at large rather than directed at pre-selected individuals or groups. The petition has cited no legal authority to show that the reach of the Fifth Amendment extends to such government action.

The protection of life in the Fifth and Fourteenth Amendments has been applied by the courts to proscribe government action taken with the overt purpose of depriving particular individuals of life. *See, e.g., Screws v. United States*, 325 U.S. 91 (1945). The petition has cited no cases where the elements of purpose and particularity were missing.[22] Rather than presenting support for its broad interpretation of the constitutional protection of life, the petition has focused instead on the meaning of "due process of law," citing a few authorities which equate due process in the context of deprivation of life with court proceedings and safeguards for persons accused. Petition, page 142. The requirements for due process involving "trials" of an "accused" do not apply to the regulation of nuclear power. The petition's due process analysis thus does not support its attempt to apply the constitutional protection of life outside the field of police and judicial action.

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[22]The Supreme Court appears to have stressed that for the Fifth and Fourteenth Amendments to apply, the threat to life must be borne by particular, ascertainable individuals rather than the public at large. Recently, in *Martinez v. State of California*, 444 U.S. 277 (1980), the Court held that a victim murdered by a State mental hospital parolee had not been deprived of life without due process of law in the constutional sense, even though the Court assumed that the State knew or should have known that the parolee's release "created a clear and present danger that such an incident would occur." *Id.* at 280. The Court noted that "the parole board was not aware that [the victim], as distinguished from the public at large, faced any special danger." *Id.* at 285.

The Fifth Amendment does not proscibe all government activity which includes loss of life among its foreseeable effects. Such a constitutional prohibition would have a disruptive effect on society, since nuclear power is not the only government-authorized activity which foreseeably can lead to deaths among members of the public. In transportation, an example of an activity subject in many aspects to licensing or other government authorization, even without negligence some fatal accidents are certain to occur, on occasion causing deaths not only to persons who have voluntarily subjected themselves to the risk of travel but also to unfortunate bystanders. In any large-scale private or government activity involving the use or licensing of vehicles, accidental deaths cas be expected. Health impacts also appear likely to result from industrial and vehicular emissions which government affirmatively authorizes or at least declines to prohibit, often solely in the interest of furthering economic activity.[23] It appears likely that many government actions affecting a complex society with a population over two hundred million could be conneted by a plausible chain of causality to at least a small number of premature deaths. Presumably, under the petition's interpretation of the Fifth Amendment, all these activities would have to cease. Logically, however, the cessation would be equally unconstitutional because the licensed activities—ambulances or power plants—also save lives.

Similarly, in the protection-of-life language of the various treaties and international covenants cited by the petition the Commission sees an effort to protect individuals against government action purposefully aimed at killing. The

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[23]Quantitative health effects estimates for generation of electricity by burning of coal also show premature deaths. Some studies have concluded these health effects will be substantially greater than those for the nuclear fuel cycle. *See, e.g.*, R.L.Gotchy, "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives," draft NUREG-0332 (1977). *See* also, "Energy in Transistion, 1985-2010," Final Report of the Committee on Nuclear and Alternative Energy Systems ("CONAES"), National Research Council, Natioal Academy of Sciences, Washington, D.C., published by W.H.Freeman and Company (1979).

petition's broader reading encounters the same social andf practical objections which make its interpretation of the Fifth Amendment unacceptable. Accordingly, the Commission finds that the petition has failed to show that either the Constitution or international law applies to the health impacts of nuclear power in any manner that requires a halt to the licensing of nuclear power plants.

Absent constitutional restraints, the power to determine the conditions under which the Commission can license nuclear plants lies with Congress. The Atomic Energy Act of 1954 authorizes the Commission to issue licenses for [46 Fed. Reg. 39589] nuclear power plants upon a finding that the facility "will provide adequate protection to the health and safety of the public." 42 U.S.C. 2232(a). Congress did not elaborate further on the meaning of "adequate protection," but it is reasonable to conclude that such a standard, as distinguished for example from "absolute" protection, left room for some degree of health impact on the public commensurate with the benefits of having a nuclear power program.[24] "Adequate" protection implies a realistic judgment. This choice of language by a Congress obviously aware of the realistic costs of technological and economic development does not suggest an intent to declare any loss of life whatsoever an unacceptable impact.[25]

[24]The Commission is now conducting a safety goal program aimed at articulating more clearly what the safety objectives in regulation of nuclear power should be. *See* 45 *Fed. Reg.* 71023 (October 27, 1980).

[25]With regard to work place hazards Congress has been explicit about its intent to tolerate harmful and possibly fatal occupational exposures to dangerous materials when complete protection is impractical. Section 6(b)(5) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.*, directs the Secretary of Labor to set standards for exposure to certain toxic materials "which most adequately assures, *to the extent feasible* . . . that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life." 29 U.S.C. 655(b)(5) (emphasis supplied). In *Industrial Union Department, AFL-CIO* v. *American Petroleum Institute*, 48 U.S.L.W. 5022 (decided July 2, 1980), the Supreme Court reviewed and rejected an OSHA standard placing strict limits on occupational exposure to benzene, a known cardinogen with no safe level of exposure yet determined. The Court saw no constitutional or

The courts have uniformly confirmed that "[a]bsolute or perfect assurances are not required [by the Atomic Energy Act], and neither present technology nor public policy admit of such a standard." *Citizens for Safe Power* v. *NRC*, 524 F2d 1291, 1297 (D.C. Cir. 1975). *Accord, Natural Resources Defense Council* v. *NRC*, 582 F.2d 166, 168 (2d Cir. 1978). Moreover, since the alternatives to a nuclear power plant, including the alternative of getting by with less electricity, carry health impacts which are aso likely to include some deaths, a nuclear facility could not reasonably be deemed to provide inadequate protection solely on the ground that its estimated fatality impact was greater than zero. The Commission thus rejects the petition's argument that nuclear plants must be held *per se* unlawful under the Atomic Energy Act if their operation will cause deaths.

The above findings dispose of the petition's legally cognizable objections to nuclear power, but the Commission does not wish to conclude this response without some attention to the petition's argument that nuclear power is morally reprehensible and an "outrage" to the conscience. Petition at 150.

This Commission does not sit as an arbiter of any national morality alleged to exist apart from the Constituion and the laws of Congress, which each Commissioner is sworn to uphold. Nor does any other Commission. Nor does any Court. While the Commission brings its best judgment to the task of applying the phrases "adequate protection" or "no undue risk" to individual cases, we do not do so in a vacuum. A country that builds highways, that licenses airplanes, that regulates coal mines, has clearly not established "zero risk" or "zero deaths" as a legal or a moral absolute.

If the petitioners feel that the statutory standards applying to nuclear power are not stringent enough on moral grounds, they must make that case to the Congress. The morality embodied in the existing statutes is not the one that they urge, and we have no power to change that.

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statutory barrier to retaining an earlier standard allowing higher exposures, even though there was evidence that OSHA's stricter but still feasible standard might prevent one or two deaths over a six-year period. 48 L.W. 5034.

That much having been said, however, we also note that we do not find nuclear power morally offensive. We agree that a decision to license nuclear plants has moral implications which deserve serious consideration, since the operation of these plants will cost human lives.[26]

With all respect to the sincerity of Mrs. Honicker's convictions on the matter, however, the Commission does not believe that a moral case against nuclear power is made out simply by noting the potential linkage between radioactive effluents and fatal cancers. As we have discussed previously, the class of socially useful activities which include among their consequences unintended, undesired, but probably unavoidable deaths is broad and too closely integrated into modern social and economic structure to be labelled morally unacceptable by the government unless the Congress should choose to do so. Furthermore, a moral judgment on nuclear power must recognize that any of the alternatives, whether use of different technologies for generating electricity or social readjustments for achieving conservation on a major scale, if examined sufficiently closely can almost certainly be linked to at least a few deaths. Thus moral distinctions among the various choices for a policy on electricity generation cannot turn simply on whether a particular choice will cause deaths. They all will. If moral judgments are ultimately to be made about nuclear power, they will have to rest on complex criteria, quantitative where possible, rather than on appealingly simple but unusable principles like "even one death is too many."

Insistence on a simplistic approach to difficult technological issues may actually increase risks to society. For example:

> Each individual or group that makes recommendations, or otherwise takes actions affecting national priorities, bears some responsibility for any adverse effects. Thus an individual who effects the banning of DDT in a tropical country may inadvertently cause far more deaths than he defers, since the incidence of malaria will

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[26]See notes 4 and 22 above.

> then increase. Similarly, if coal-burning electric generating plants are found to cause far more premature deaths than nuclear power plants (in agreement with most published estimates), an individual or agency that successfully advocates the construction of coal-burning plants instead of nuclear power plants may be responsible for unnecessary deaths. If the media should present an unbalanced perspective on some aspect of risk in society, and this causes risk-reduction priorities to be set inefficiently and even wrongly, the responsible media would, in effect, be contributing to the causing of premature deaths that might otherwise have been averted.

David Okrent, "Comments on Societal Risk," *Science*, Vol. 208, pp. 373, 374 (April 25, 1980).

Nonetheless, costs in human lives stand apart from other costs. For the reasons we have discussed, some deaths from activities with the scope and value of nuclear power are "acceptable," at least in the sense that the Congress, the Executive, and the Judiciary know about them and accept them.

The benefit provided by nuclear power, generation of electricity, is clearly of great value to society. Although the program is not free of hazards, the risks to any individual are slight. The number of deaths estimated to result from the nuclear power program is extremely small compared to the number of persons benefitted, and it may be expected that all reasonable means to reduce the health impacts still further will be taken as they are discovered. Realistic alternatives to the nuclear power plants now under license would carry a cost in lives comparable to and in all probability greater than the impacts estimated for the nuclear plants. That is why the estimated fatalities from the nuclear power program do not mandate a a shutdown of the industry for reasons either of law or of conscience.

For the reasons given in the foregoing analysis, the

Commission has denied the Honicker petition.

It is so ordered.

Dated at Washington, D.C., this 28th day of July 1981.

Samuel J. Chilk

Secretary of the Commission.